HUNTRESS ASSOCIATES
Landscape Architecture & Land Planning

July 27, 2020

Ms. Anne Kitchell, Associate Principal
Horsley Witten Group, Inc.
90 Route 6A – Unit #1
Sandwich, MA 02563

Re: Martha's Vineyard Regional High School – Athletic Field Improvements

Dear Ms. Kitchell;

I received your email and questions dated July 22, 2020, regarding the MVRHS's Application for an amended DRI, as referenced above. I have coordinated our reply with the MVRPS and project team. The following is a listing of your questions and our responses.

1. **The post-development watershed map included in the drainage report does not match the grading and drainage plan Sheet L2 (see grading, parking configuration, chamber elevations, etc.). Can you confirm that the modeling is based on the most current design plan?**

   Response: I have confirmed with John Barrows P.E. that the drainage calculations account for the updated and revised plans originally dated January 22, 2020 and updated on April 28, 2020. Please see the attached memo dated July 24, 2020 from Marchionda Associates, LP.

2. **Is there any additional drainage information or modeling available associated with the soccer field portion of the project?**

   Response: The stormwater report did not include an analysis of the improvements to the adjacent natural grass field soccer field (Field #2). It is our opinion that since the field will be renovated 'in-kind" as a natural grass field that the post construction drainage conditions from this area will be unchanged. Please see the attached memo dated July 24, 2020 from Marchionda Associates, LP.

3. **Can you confirm that the proposed synthetic materials have not been tested specifically for this project? We saw a quote from the Cooperstown Environmental to do this testing and commentary that testing would be included in the construction contract.**

   Response: The proposed synthetic turf materials have not been tested by Cooperstown Environmental. We worked with James Curtis at Cooperstown, a licensed Massachusetts LSP, to develop a scope for testing the turf and infill materials but felt that the MVC may want a third-party independent test completed by others. The Infill Synthetic Turf Specification, attached, requires third-party independent testing of all material prior to their being accepted for use at MVRHS. Please refer to the attached specification para 1.06(m) and para 1.06(n) for additional detail.

4. What were the calculations/assumptions used to generate the wastewater volume and tank pump out frequency estimates cited in the answers to questions dated May 26th?

Response: The following are the assumptions made for flow volumes for wastewater at the new field house:

Sports Field Attendance*		***Flow Rate/person***	***Total Flow/Season***
Fall Sports Participants:	*14,232*		
Fall Sports Spectators:	*3,805*		
Total Fall Attendance:	*18,037*	*(3 gallons)*	*54,111 total gallons*
Spring Sports Participants:	*8,280*		
Spring Sports Spectators:	*1,420*		
Total Fall Attendance:	*9,700*	*(3 gallons)*	*29,100 total gallons*
Total Annual Flow			*83,211 total gallons*
Average per month (Assume 9 months annually)			***9,245 gallons/month***

**Participants and spectator attendance taken from 2019 Field Use analysis provided by MVRHS Athletic Dept Staff.*

5. Were any estimates of fertilizer usage done to compare current field maintenance /applications vs proposed conditions to quantify estimated fertilizer load reductions /increases?

Response: Yes, we reviewed the existing fertilization schedule with Mike Taus, Facilities Director at MVRHS, as we drafted our recommended turf maintenance guidelines. Mr. Taus verified that MVRHS was in compliance with the Oak Bluffs Board of Health Regulations for application of fertilizer (SECTION 21.0) and confirmed that cumulative applications of Fertilizer did not exceed 3.0 pounds of nitrogen per 1000 square feet of Turf per year.

6. Has any information for lighting operations (other than lighting plan and notes on reduced energy consumption) been provided to help reduce unnecessary light pollution (e.g., any consideration of IDA certification program for community-friendly sports lighting)?

Response: Please find attached an updated Light Level Summary prepared by Musco Sports lighting, dated July 23, 2020. I can confirm that the proposed light levels comply with IDA program recommendations for community-friendly sports lighting.

Thank you for your time and consideration. Please let me know if you have any questions or require any additional information to complete your review.

Sincerely;
Huntress Associates, Inc.

Christian C. Huntress
President

Cc: Alex Elvin, General Planner, MVC
Matthew D'Andrea – MVRPS Superintendent
Richard Smith – MVRPS Asst. Superintendent
Kimberly Kirk – Chair, MVRHS School Committee
Joseph Sullivan – Daedalus Projects, Inc.
Oak Bluffs Planning Board

Marchionda & Associates, L.P.
Engineering and Planning Consultants

MEMORANDUM

To: Chris Huntress

From: John Barrows, PE

Re: MVRHS Stadium Project Drainage Analysis

Date: July 24, 2020

In response to recent correspondence, we can confirm that the calculations and analysis completed by Marchionda & Associates, LP in the Storm Water Report dated; January 22, 2020 corresponds to the proposed conditions depicted in your latest project plans dated; January 22, 2020 and revised; April 28, 2020 .

The Storm Water Report did not include an analysis of the improvements to the adjacent natural grass “soccer” field. It is our opinion that since the field will be renovated “in-kind” as a natural grass field that the post construction drainage conditions from this area will be unchanged.

62 Montvale Avenue, Suite I
Stoneham, MA 02180-363
Phone: 781-438-6121
Fax: 781-438-9654
E-mail: mail@marchionda.com
www.marchionda.com

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SYNTHETIC FIELD SPORTS SURFACING

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

A. Include GENERAL CONDITIONS and all other Division 1 - General Requirements as part of this section.

B. It is the intent of this Section to specify an Infilled Synthetic Turf System that provides a high quality playing surface for multi-purpose MIAA athletic use that is similar to well maintained natural grass. The finished surface shall be immediately firm, consistent and stable while providing long term durability, safety and shock attenuation. The Infilled Synthetic Turf System Vendor's attention is called to the testing requirements related to G-Max rating per ASTM F355-A. A G-Max rating of less than 90 or in excess of 165 at any time from acceptance through the end of the Warranty Period is unacceptable.

C. Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.

D. Coordinate work with trades affecting, or affected by, work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK

A. Provide an inspection and certification of subsurface drainage system and free draining subbase prior to commencement of subsequent work.
B. Furnish and install a new Infilled Synthetic Turf System on the proposed free draining base. Synthetic Turf system to include parallel long-slit film polyethylene fibers and spineret or extruded monofilament fibers woven into a high quality backing, resilient infill mix, and cast-in-place concrete nailer as shown on the plans and otherwise specified herein.
C. Provide woven, inlaid and/or painted lines and markings or other such graphics as shown on the Drawings and approved Shop Drawings.
D. Provide all attachments and penetrations as required to complete the work as shown on the Drawings and approved Shop Drawings.
E. Provide a drainage test on free draining subbase prior to installation of new synthetic turf surface in conformance with *ASTM F 2898 - 11 Standard Test Method for Permeability of Synthetic Turf Sports Field Base Stone and Surface System by Non-confined Area Flood Test Method*
F. Provide GMax testing upon completion.
F. Provide warranty and field maintenance training.
G. Provide Field Groomer and Sweeper attachments for field maintenance.

1.03 RELATED WORK

A. Site Preparation
B. Earthwork
C. Cast-in-Place Concrete Curb
D. Chain Link Fence and Gates
E. Storm Drainage System
F. Protective Netting

1.04 REFERENCES

A. American Society for Testing and Materials (ASTM).
B. Consumer Products Safety Commission (CPSC).
C. Massachusetts Interscholastic Athletic Association (MIAA)
D. US Lacrosse (USL).
E. United States Soccer Federation (USSF).
F. Federation Internationale de Football Association (FIFA).

1.05 QUALITY CONTROL

A. Experience:

1. Infilled Synthetic Turf System shall be provided by an experienced specialty vendor which shall have supplied at least 25 outdoor athletic field systems of 75,000 s.f. or greater of the type and installation process herein specified within the last three (3) year period.

2. Infilled Synthetic Turf System installation shall be performed by an experienced specialty contractor which shall have lain at least 25 outdoor athletic field systems of 70,000 s.f. or greater of the type and installation process herein specified within the last three (3) year period.

3. All installation operations shall be performed by personnel fully familiar with the materials and their application under the full time direction and supervision of a qualified technical supervisor directly employed by the Infilled Synthetic Turf System Vendor. Installation supervisors shall have a minimum of 3 years experience in the installation of Infilled Synthetic Turf Systems.

B. Source Limitations: Obtain Infilled Synthetic Turf System including woven synthetic turf yarn and carpet backings from a single Synthetic Turf Manufacturer. Provide additional system components including anchoring materials, seaming products, binders and adhesives, and infill materials meeting the criteria of this Specification Section from single sources.

C. Inspection and Acceptance: The Infilled Synthetic Turf System Vendor and Contractor shall inspect the subgrade and drainage system to verify their acceptance of installation and condition. Commencement of subsequent installation in a given work area indicates acceptance of underlying substrates and systems.

D. Planarity and Grade: Deviation in planarity within the finished surface shall not exceed 1/8" beneath a 10' straightedge. Deviation from a straight grade between levels on

drawings shall not exceed 1/4".

E. Protection: Heavy equipment or vehicles of any kind should not be allowed on the field area subsequent to the completion of the drainage system.

F. Restoration of Damage: Infilled Synthetic Turf System Vendor shall exercise care in the execution of his work and avoid damage or defacement of adjacent or surrounding areas by using suitable protective means. Damage or defacement which occurs shall be remedied at Infilled Synthetic Turf System Vendor's cost to the satisfaction of the Awarding Authority.

1.06 SUBMITTALS

A. Submit the following in accordance with the Conditions of the Contract and Division 1 Specifications:

1. Manufacturer's Literature:

a. Submit a signed statement from the Infilled Synthetic Turf System Vendor that the Drawings and Specifications have been reviewed by a qualified representative of the Infilled Synthetic Turf System Vendor and major materials suppliers, and that they are in agreement that the materials and installation method to be used for the Infilled Synthetic Turf System are proper and adequate for use a multi-purpose athletic field in the Commonwealth of Massachusetts.

b. A recent reference list of at least 25 fields supplied by the Infilled Synthetic Turf Vendor of the type and installation process specified herein with contract name, address and telephone number to enable such data to be validated prior to the commencement of work.

c. A recent reference list of at least 25 fields installed by the Infilled Synthetic Turf Installer of the type and installation process specified herein with contract name, address and telephone number to enable such data to be validated prior to the commencement of work.

d. Job Resumes of Infilled Synthetic Turf System Vendor's Installation Supervisor and Infilled Synthetic Turf System Installers.

e. Cut Sheets for all materials required under this Section including third party ASTM certified lab reports.

f. Manufacturer's written warranties for all individual component's of the Infilled Synthetic Turf System.

g. Provide a sample written 10-year labor and materials warranty from the Infilled Synthetic Turf System Vendor.

h. Infilled Synthetic Turf System Vendor's written ten (10) year Infilled Synthetic Turf System warranty.
i. Manufacturer's written warranties for the Field Groomer and Sweeper.
j. Material Safety Data Sheets for all products listed in this Section.
k. Product data, including independent laboratory test results on all product requirements, including 100,000 Lisport cycle test results.
l. FIFA Preferred Producer Verification Information.
m. The Synthetic Turf Manufacturer must provide documentation outlining their product lifetime recycle / reuse program. All material must be able to be cradle-to-cradle certified and demonstrate 100% closed loop recyclability, **recycling for energy not acceptable.**
n. The synthetic turf vendor shall provide a statement certifying the their products and manufacturing processes, including upstream suppliers, does not use any PFAS chemicals currently listed as part of California's Proposition 65 regulations or identified as part of US EPA's Method 537 to manufacture the components of its turf field products, including the fibers, backing and any coating materials. This certification must be confirmed through independent, third party laboratory testing of the specified product.

2 Shop Drawings:

a. Provide details which illustrate the scope of work, including but not limited to materials, cross sections, subsurface and penetration details

b. Provide a seaming plan at 1"=20'-0".

c. Provide a striping plan at 1"=20'-0" which includes layout for all sports identified in Para 3.05 FIELD LAYOUT, showing field lines, center markings, boundaries, and other field markings in compliance with MIAA requirements and as otherwise shown on the drawings.

d. Supply shop drawings (including details) at an approved scale for location, installation and erection of the cast-in-place concrete nailer.

3. Product Samples and Information:

a. Provide color samples of manufacturer's standard parallel long-slit film polyethylene and spineret or extruded monofilament fiber.
b. Provide a minimum 12-inch by 12-inch sample of slit film polyethylene and mono-filament carpet. One edge of the sample shall contain a 4-inch woven white line and a 4-inch yellow line inlaid through the middle to depict materials, colors and workmanship. Provide additional carpet samples for other colors required under this section.
c. Provide 12" long sample of 15" wide seaming tape.
d. Provide sieve analysis of infill materials for approval.
e. Provide a 1-quart sample of the infill mix at the Landscape Architect's approved mix ratio.
f. Provide information regarding future requirements for painting of field

surface.

4. Provide delivery slips for all Infilled Synthetic Turf System materials delivered to the site.

5. Provide Field Maintenance Training and written Operations and Maintenance Manual to the Awarding Authority.

6. Provide As-Built Field Layout Drawing upon completion of Work.

1.07 DELIVERY. STORAGE AND HANDLING

A. Deliver, store and handle products in exact accordance with the Manufacturer's requirements and specifications.

B. Products delivered to the site which are not in compliance with the requirements of this Section shall be removed from the site immediately at no cost to the Awarding Authority.

1.08 PROJECT CONDITIONS

A. Weather Limitations: No part of the construction shall be conducted during a rainfall or when rainfall is imminent. No part of the construction shall be conducted unless both ambient and materials temperatures are at least 40 degrees F and rising.

B. After a rainfall, sufficient time shall be given to allow surfaces and infill materials to dry before resuming work. Surfaces and materials shall be dry, as well as clean. Adhesives should not be applied within 12 hours after rainfall, or when rainfall is forecast.

C. Do not apply Infilled Synthetic Turf System materials or components over wet, frozen, or muddy base.

1.09 WARRANTY

A. Warranty: The Infilled Synthetic Turf System Vendor shall provide a third party insured warranty guaranteeing all manufactured and procured Infilled Synthetic Turf System materials and workmanship against damage by climatic conditions or proper and normal use (including the use of cleats) for a minimum period of ten (10) years from the official date of Substantial Completion. In addition, the Infilled Synthetic Turf Warranty shall guarantee all manufactured and procured materials and/or workmanship including such defects as premature decrease in infill height, premature decrease in pile height or weight (stipulated as more than 10% decrease), UV degradation, fading, seam rupture, dislodgement, inadequate drainage or inadequate air transmission. The guarantee shall be in writing, stating the any defects, including the need to remove and replace manufactured and/or procured materials will be repaired at no cost to the Awarding Authority within 7 days written notice of the Awarding Authority. The warranty coverage shall not be prorated nor limited to the amount of the usage. Warranty coverage shall provide for $10 million per year in the aggregate and $5 million per claim minimum.

B. Performance Testing:

1. The Infilled Synthetic Turf System Vendor shall, at their own expense, have G-Max testing performed by an approved and certified independent testing laboratory prior to requesting Substantial Completion. Testing shall consist of shock attenuation per ASTM F-355-A. The Awarding Authority and Landscape Architect shall be provided with copies of all testing.

2. Testing shall be performed at the field's center, the goal locations for all sports and at 10 yards inside each corner of the field. Tests shall also be taken at 4 random spots as chosen by the Landscape Architect or Awarding Authority.

3. At no time shall the G-Max be less than 90 nor exceed 125 at any one point of the field. (Refer to Section 32 18 23.30 SYNTHETIC FIELD UNDERLAYMENT, for additional GMax information)

4. In cases where the result of a test falls outside the specified values, additional tests shall be taken in 10-foot increments in 4 opposite directions (north, south, east and west) from the failing test point and each subsequent failing test point until all tests fall within the specified values. The failing area shall be marked off, repaired and retested by the Infilled Synthetic Turf System Vendor until all tests fall within the specified values.

5. G-Max testing during the remainder of the warranty period will be performed by and at the discretion of the Awarding Authority. Results of these tests will be provided to the Contractor and Infilled Synthetic Turf Vendor.

1.10 PATENT RIGHTS AND INFRINGEMENT

A. There are various established performance criteria throughout this request for products and services. There may exist patent coverage for some means and methods of achieving those performance criteria. Bidders are responsible for ascertaining that means and methods of the products and services which they are providing are not being provided in violation of any such patent rights. Bidder's responsibilities are as follows:

1. To hold harmless, the Awarding Authority, Landscape Architect and the Awarding Authority's other consultants, as to any violation to include dollar amounts that could be owed as a result of damages for infringement including potential treble damages as provided for under U.S. Patent Law.

2. Any and all costs that the Awarding Authority, Landscape Architect and/or the Awarding Authority's other consultants, would incur in replacing materials and services which are determined to infringe patent rights.

3. All administrative, legal and other costs that would be incurred as a result of an infringement.

B. If any product or services proposed to be provided by the bidder are known by the bidder to be subject to any existing claims of infringement, bidder shall notify Awarding Authority and Landscape Architect of such claim and provide evidence of financial ability

to perform on the above hold harmless requirements.

PART 2- PRODUCTS

2.01 BASE AND DRAINAGE MATERIALS

A Geotextile Fabric:

1 Non-woven polypropylene geotextile fabric shall be chemically and biologically inert and shall be equivalent to the following:

a. Mirafi 140N, Mirafi Inc., Pendergrass, GA (888) 795-0808
b. Poly Filter-X, Carthage Mills (800) 543-4430
c. Supac-5P, Phillips Fibers Corp.

B. Free Drainage Gravel Sub-Base for Infill Synthetic Turf System.
The contractor shall verify that the existing subbase system provides a uniformly mixed processed stone over the entire synthetic turf subgrade. The contractor shall extend and repair the aggregate to a depth as indicated on the record drawings and shall insure that the final base constitutes a compacted, stable, permeable stone subbase course. Care shall be taken during installation, amendment and recompaction of the aggregate to maintain the grade designed and installed for the subgrade below. The capability of the processed stone drainage layer to meet the stability and permeability requirements must be determined by a certified laboratory prior to the construction of the base course. Aggregate shall be durable and shall not exceed 12% loss of materials as determined by a sulfate soundness test (ASTM C88). The processed stone layer shall be compacted to a minimum of 95% of maximum density per ASTM D698. Gradation shall conform to the following:

Sieve Designation	% Passing by Weight
1.5"	100
1"	95-100
.75"	80-100
.50"	60-80
.375"	30-50
No. 4	20-40
No. 8	10-30
No. 40	5-17
No. 200	0-2

INFILL SYNTHETIC TURF SYSTEM

A. Fiber Requirements

1. Pile fiber yarns shall be woven in matrix stitch pattern built with a total of 80,000 denier, composed of four (4) bundles of 12,000/6 Extreme XWRD a four (4) bundles of 8000/1 XPS. Fibers shall be long diamond shaped monofilament at 365-micron width and slit-film polyethylene fibers at 36 fibrils. The pile fibers shall be woven and produced to mimic a grass-like surface to a finished pile height of approximately 2.00". Turf product shall have shown no visible wear after completion of 100,000 Lisport

cycles by a certified testing institute. Adequate UV protection is essential to the long-term durability of any artificial grass fiber. The fiber must contain both a short-term and a long-term active ingredient for protection during the extrusion process and when installed in the field. The pigments used in the fiber must be UV stable and heavy metal free.

2. All pile and backing fibers must be manufactured by TenCate, or pre-approved equal.

3. The synthetic turf fabric shall be filled with a pelletized wood infill mixed with sand with a minimum of 7 lbs per sf. **No SBR Rubber shall be used.**

B. All components and their installation method shall be designed and manufactured for use on outdoor athletic fields. The materials as hereinafter specified should be able to withstand full climatic exposure in all climates, be resistant to insect infestation, rot, fungus, mildew, ultraviolet light and heat degradation, and shall have the basic characteristics of flow-through drainage, allowing free movement of surface runoff through the synthetic turf fabric where such water may flow to the existing base and into the field drainage system.

C. The finished playing surface shall appear as mowed grass with no irregularities and shall afford excellent traction for conventional athletic shoes of all types. The finished surface shall resist abrasion and cutting from normal use. The system shall be suitable for football, soccer, lacrosse, baseball, softball, PE classes, intramurals, and recreational use.

D. The polyethylene parallel long-slit-film pile fiber and the spinneret/extruded monofilament fiber shall be a proven athletic caliber fiber designed specifically for outdoor use and stabilized to resist the effect of ultraviolet degradation, heat, foot traffic, water, and airborne pollutants. The pile fiber shall possess the following physical characteristics:

	SYNTHETIC TURF	**METHOD**
Yarn	UV resistant XWRD Extreme monofilaments blended with XP Extreme - Each matrix group is built with a total of 80,000 denier (4 bundles of 12000/6 MS XWR Diamond at 365-micron width with 4 each 8000/1 XPS tapes (28 fibrils))	
Yarn Denier	80,000/48 ± 500	ASTM D 1577
Yarn Thickness / Width	365 microns & 28 Fibrils	ASTM D 3218
Breaking Load	18.1 lbs force (avg)	ASTM D 5034
PE Pile Fiber Weight	59.0 or 66.0 oz./yd2	ASTM D 5848

E. The Pile fabric shall possess the following physical characteristics:

Finished Pile Height	2.00"	ASTM D 5823
Product Weight (total)	98 oz/yd2	ASTM D 5848
Backings Yarns	16 oz/yd2	ASTM D 5848
Secondary Backing wt.	16.0oz/yd2	ASTM D 5848
Fabric Width	13' or 15'	ASTM D 5793
Tuft Bind Strength	>18lbs	ASTM D 1335

F. Pre-Installation Submittal: Prior to the completed synthetic turf product being shipped to the project site, the synthetic turf manufacturer shall provide the in-house Production Report to the Landscape Architect. The Production Report shall be specific to the material being shipped, and include results of in-house testing completed on the turf manufactured for this project. The manufacturer's full-time in-house certified inspectors shall perform pre-weaving fiber testing on tensile strength, elongation, tenacity, denier, shrinkage, and twist turns per inch upon receipt of fiber spool from fiber manufacturer. The Production report must indicate that the synthetic turf being shipped is in compliance with all performance criteria identified herein. The Production Report must be signed by the plant's Production Manager and/or Quality Control Manager who oversaw the manufacturing of this synthetic turf product. The Production Report must be submitted to and acknowledged by the project Landscape Architect prior to shipping material to the job site.

The Landscape Architect hereby reserves the right to require that the General Contractor provide independent third-party laboratory testing of the manufactured synthetic turf product to insure compliance with the identified performance criteria noted in paragraph D and E, above. The synthetic turf fibers and the primary backing must be manufactured as one single process.

G. Rolls shall be a minimum of 15 feet wide. Rolls shall be of sufficient length to cover from sideline to sideline without head seams.

H. Adhesives for bonding synthetic turf shall be two-part moisture cured polyurethane obtained from a single manufacturer. Adhesive shall be equal to Ultrabond Turf PU 2K as manufactured by Mapei Corporation, Inc., or approved equal. Adhesives must carry an eight (8) year warranty.

I. Tape for securing inlaid lines and logos shall be high quality coated cordura tape made specifically for Infilled Synthetic Turf applications with a minimum roll width of 15 inches.

J. The Infilled Synthetic Turf System Vendor shall provide double stitched locked seams to secure the synthetic turf panels. The Infilled Synthetic Turf System Vendor is informed that all seams shall be flat and indiscernible upon installation. Shearing of the slit film pile will not be permitted as a means of achieving a flat seam.

K. If the Infilled Synthetic Turf Vendor intends to modify any of the above criteria, it shall first

be approved in writing by the Awarding Authority prior to submitting a bid.

L. Perimeter edge details, underground storm sewer piping and connections, and goal post foundations required for the system shall be as detailed and recommended by the manufacturer, and as approved by the Awarding Authority.

M. Acceptable Infilled Synthetic Turf Systems include:

	Manufacturer	Product	Pile Weight	Contact Number
1.	Greenfields	IronTurf	(59oz/sy)	(978) 761-5340

N. Infill Materials shall be uniformly filled to a depth which leaves no more than 1/2" of exposed pile after settlement. Acceptable infill materials are outlined below.

2.03 INFILL MATERIAL

The synthetic turf fabric shall be filled with a pelletized wood infill mixed with sand with a minimum of 7 lbs per sf, leaving no more than 0.5" of exposed synthetic turf fiber above the infill upon completion and settlement. No SBR Rubber shall be used. The synthetic turf infill material shall be specifically designed and manufactured for athletic use. It shall be blend of a highly rounded silica sand and a rounded and highly uniform wood particle having the following properties:

1. Product to be Brockfill ® manufactured by Brock USA. or pre-approved equal.
2. Infill shall be an engineered wood particle comprised of virgin natural pine wood grown and manufactured in the USA.
3. Infill shall be free of pesticides and heavy metals.
4. Infill shall maintain a vertical drainage rate that exceeds that of the artificial turf when tested alone according to test method ASTM 1551.
5. Infill shall not materially degrade as an infill defined as a minimum of 80% of the material will fall between sieve screens of .8mm-2mm when tested according to BS EN 933-1:2012.
6. Infill shall be made from a species of tree that is sustainably harvested.
7. Infill shall be domestically sourced – made in the USA only.
8. Infill shall have a minimum of a 10-year warranty.
9. Infill must be hydrophilic and allow absorption of rain or condensation.
10. Infill must have a minimum bulk density of 15 lbs / cu ft

2.04 CONCRETE SYNTHETIC TURF ANCHOR

A. The concrete synthetic turf anchor for attaching the synthetic turf carpet shall be an extruded or cast-in-place concrete curb and shall be provided and installed as specified in Section 32 16 13.13, Cast-ln-Place Concrete Curb.

PART 3- EXECUTION

3.01 GENERAL

A. The installation shall be performed in full compliance with approved Shop Drawings.

B. All installation operations shall be performed by personnel fully familiar with the materials

and their application, under the full-time direction and supervision of a qualified technical supervisor employed by the Vendor of the Infilled Synthetic Turf System. Installation supervisors shall have a minimum of 3 years of experience.

C. The surface to receive the Infilled Synthetic Turf System shall be inspected and certified by the Contractor and Infilled Synthetic Turf System Vendor as ready for the installation of the Infilled Synthetic Turf System and must be perfectly clean as installation commences and shall be maintained in that condition throughout the process.

3.02 DRAINAGE AND BASE INSTALLATION

A. Install backfill in accordance with Section 33 40 00 - Storm Drainage System.
B. Install Free Draining Base in accordance with paragraph 2.01 of this section.

3.03 BASE VERIFICATION

A. The Contractor and Infilled Synthetic Turf Vendor shall verify that the subsurface drainage system is functioning properly prior to the commencement of the Infilled Synthetic Turf System installation by performing a drainage test on free draining subbase prior to installation of new synthetic turf surface in conformance with *ASTM F 2898 - 11 Standard Test Method for Permeability of Synthetic Turf Sports Field Base Stone and Surface System by Non-confined Area Flood Test Method.*

B. The Free Draining Base shall be inspected by the Contractor or Infilled Synthetic Turf System Vendor by means of a laser level on a 25-foot grid pattern. Based on the inspection of the topological survey, the Contractor or Infilled Synthetic Turf System Vendor shall fine grade the Free Draining Base suitably, including proper rolling and compaction. The Free Draining Base shall not be approved for tolerance to grade without obtaining a topographic survey. Submit electronic topographic survey to Landscape Architect for review and approval.

C. The Free Draining Base shall be tested to insure a 95% maximum dry density per a standard proctor test at the contractor's expense.

D. Upon written certification from the Contractor and Infilled Synthetic Turf Vendor that the Free Draining Base and drainage system have been properly installed, the Infilled Synthetic Turf System installation shall commence.

3.04 INFILLED SYNTHETIC TURF SYSTEM INSTALLATION

A. Synthetic Turf shall be installed with no wrinkles, ripples or bubbles. Shearing of fibers, slits in the fabric or driven spikes or staples to relieve such defects will not be permitted.

C. Synthetic Turf rolls with shall be installed perpendicularly across the field. Turf rolls shall be of sufficient length to permit full cross-field (sideline - sideline) installation. No head or cross seams will be allowed. Once all playing surface rolls have been installed, install sideline rolls perpendicularly to playing surface rolls and attached by stainless steel screws or ramset at a maximum of 18-inch intervals directly to the concrete nailer shelf. Rolls shall be installed so that lines are placed as shown on the approved Shop Drawings. Care shall be

taken to insure that seams are not located in close proximity to the sliding areas associated with the baseball infield.

D. All Synthetic Turf seams shall be adhered with high strength tape and glued as stated above. The Infilled Synthetic Turf Vendor shall provide glued seams. All seams shall run perpendicularly across the field. Seams shall be flat, tight, and permanent with no separation or fraying. Synthetic Turf Yarn pile that is trapped or glued between seems shall be freed from the seams by hand or other approved method to an upright position prior to brushing and infilling.

E. All Synthetic Turf inlays, logos and other field markings shall be adhered with high strength tape and glued as stated above. Inlay seams shall be flat, tight, and permanent with no separation or fraying. Synthetic Turf Yarn pile that is trapped or glued between inlay seams shall be freed from the seams by hand or other approved method to an upright position prior to brushing and infilling.

F. Upon completion of seaming and inlaying and prior to infilling, the entire field shall be brushed with a motorized rotary nylon broom to free trapped or tangled fibers. The blended infill materials shall be spread evenly by using a drop spreader in uniform rate multiple applications until the specified infill depth (after settlement) is achieved. Between each application of the blended infill materials the field shall be brushed in multiple directions with the motorized nylon broom to stand the pile upright and fully distribute the blended infill materials within the pile.

G. Upon completion the Infilled Synthetic Turf System Vendor shall provide the Awarding Authority with independent testing data stating that the finished field falls within the required minimum and maximum G-Max ratings. The cost of this test shall be the responsibility of the contractor.

3.05 FIELD LAYOUT

A. Soccer Field:

1. Soccer Field shall be marked in accordance with NFHS Rules and Interpretations, latest edition.
2. Field shall have 4" wide inlaid yellow center, halfway, goal line and touchlines. All other field markings shall be installed per the approved Shop Drawings.
3. Perimeter dimensions taken to the outside of the line.

B. Men's Lacrosse Field:

1. Lacrosse Field shall be marked in accordance with NFHS Rules and Interpretations, latest edition.
2. The center, side and end shall all be 4" wide, the goal lines shall be 2" wide. The restraining line shall be 2" width on both side of the common football yard line. All lines to be inlaid, color to be selected by owner from manufacturer's standard range of colors.
3. Perimeter dimensions taken to the outside of the line.

C. Women's Lacrosse Field:

1. Lacrosse Field shall be marked in accordance with NFHS Rules and Interpretations, latest edition.
2. The center, side, end and restraining lines shall all be 4" wide, and common with soccer. The goal lines shall be 2" wide. All lines to be inlaid, color to be selected by owner from manufacturer's standard range of colors.
3. Perimeter dimensions taken to the outside of the line.

D. Field Hockey Field:

1. Field Hockey Field shall be marked in accordance with NFHS Rules and Interpretations, latest edition.
2. All lines to be inlaid, color to be selected by owner.
3. Perimeter dimensions taken to the outside of the line.

E. Football Field:

4. Football Field shall be marked in accordance with NFHS Field Diagram Guide Rules and Interpretations, latest edition.
5. Field shall have white inlaid lines, numbers, hashmarks and field markings, installed per the contract documents.
6. Perimeter dimensions taken to the outside of the line.

3.06 LOGOS AND GRAPHICS

A. Electronic files for all logos and graphics will be provided to the Infilled Synthetic Turf Vendor by the Landscape Architect. Do not scan images from the Project Documents or Approved Shop Drawings or download images from websites for use in fabricating logos or graphics. Logos and graphics as indicated on the Drawings shall be inlaid per the Approved Shop Drawing. Logos and graphics shall be cut via laser or precision waterjet and assembled offsite for one-piece installation. Infilled Synthetic Turf System Vendor to provide mechanical perforations in the assembled logos and graphics as required to meet the specified drainage and air transmission requirements of the Infilled Synthetic Turf System.

3.07 POST CONSTRUCTION FIELD MAINTENANCE PROGRAM

Subsequent to Final Completion, provide the Owner with two (2) years of Post Construction Field Maintenance Services including but not limited to:

A. A complete inspection of the entire field area to include:

1. Inspection of seams, inlays, logos, penetrations and connections.
2. Inspection of Carpet Pile for premature fading, excessive fibrillation, wear and/or decreased height and weight.
3. Inspection of the Infill for depth and consistency.
4. Inspection of the Infill for consistency of feel and excessive hardness or softness.
5. Immediate repair or replacement to correct deficiencies noted during inspection.

6. Complete brushing of the field with a motorized rotary broom to redistribute and level the Infill and rejuvenate the Carpet Pile.
7. Provide G-Max and HIC testing per the Project Specifications.

B. Provide a Complete Field Service Report of all observations and activities to the Owner and Landscape Architect.

C. Post Construction Field Maintenance shall be performed a minimum of two (2) times during the first full year after Final Completion. Post Construction Field Maintenance shall be performed at the discretion and approval of the Owner and with at least fourteen (14) days prior notice to the Owner.

3.08 CLEAN UP

A. Provide the labor, supplies and equipment as necessary for final cleaning of surfaces and installed items. Surfaces, recesses, enclosures, etc. shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate use by the Awarding Authority.

3.09 ACCEPTANCE

A. Should any imperfections develop in the surface areas prior to the final acceptance of the work, they shall be removed and replaced with new materials.

B. All such repair work shall be done at no additional cost to the Awarding Authority.

PART 4 – REMOVAL & RECYCLING

4.01 GENERAL

A. The Synthetic Turf System Vendor shall be responsible to remove, reclaim and recycle the synthetic turf system at the end of its useful life at no additional cost to the owner. The Synthetic Turf System Vendor shall provide a signed affidavit at the time of bid that, at the end of the synthetic turf system's useful life, 100% of the turf product will be removed, reclaimed and recycled as outlined below.

B. The Synthetic Turf System Vendor must provide documentation outlining their product lifetime recycle / reuse program. All material must be able to be cradle-to-cradle certified and demonstrate 100% closed loop recyclability, **recycling for energy not acceptable.**

C. Prior to final acceptance of the synthetic turf field, the Synthetic Turf System Vendor shall set up an Escrow-Secured Guarantee by placing $50,000 into an Escrow Account at an FDIC insured institution, the account to be held jointly by the Owner and the Synthetic Turf Manufacturer-Installer. All funds in the account shall be released by the Owner to the Manufacturer-Installer (at the recommendation of the Architect) upon the successful recycling of the turf at the end of its useful life, per the provisions outlined herein. Should the Manufacturer be unable for any reason to recycle the turf field as per the provisions of the specifications, the Owner shall be entitled to the funds, including interest, for the purpose or recycling the turf properly by other means and other parties.

D. All removal and recycling operations shall be performed by personnel fully familiar with the materials and their application, under the full-time direction and supervision of a qualified technical supervisor employed by the Vendor of the Infilled Synthetic Turf System. Installation supervisors shall have a minimum of 3 years of experience.

E. The removal, reclamation and recycling process shall include the following:

1. No less than 95% of infill is extracted from synthetic turf.
2. Synthetic turf is cut, rolled tightly and secured.
3. Synthetic turf rolls are steel banded and stacked into containers.
4. Synthetic Turf Vendor will maintain chain-of-custody, including the following information:

    a. Project Name and site location.

    b. Serial number of all containers.

    c. Synthetic Turf System Vendor will be responsible for the cost to transport all containers to and from the project site, as well as freight to the selected synthetic turf recycling facility.

    d. Synthetic Turf System Vendor shall provide to the Owner documentation pertaining to the date all containers arrive and depart from site; Date of arrival at turf recycling facility, and; Date of final processing into post-consumer products.

    e. Issuance of Certificate of Compliance Once synthetic turf has been received and processed, a Certificate of Compliance will be issued with reference to job name, site location, date turf products left the site, serial number of container, date received at plant and date processed into post-consumer products. Synthetic Turf System Vendor will be responsible for confirming 100% of the synthetic turf was recycled into post-consumer products.

END OF SECTION

Martha's Vineyard McCarthy Field

Oak Bluffs, MA

Lighting System

Pole / Fixture Summary

Pole ID	Pole Height	Mtg Height	Fixture Qty	Luminaire Type	Load	Circuit
F1-F2	80'	80'	10	TLC-LED-1500	14.30 kW	A
		16'	2	TLC-BT-575	1.15 kW	A
F3-F4	80'	80'	10	TLC-LED-1500	14.30 kW	A
		25'	2	TLC-BT-575	1.15 kW	A
4			***48***		***61.80 kW***	

Circuit Summary

Circuit	Description	Load	Fixture Qty
A	Multipurpose	61.8 kW	48

Fixture Type Summary

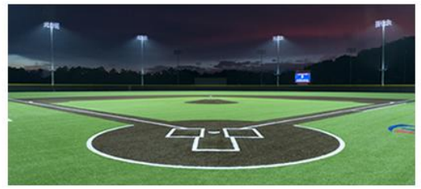
Type	Source	Wattage	Lumens	L90	L80	L70	Quantity
TLC-BT-575	LED 5700K - 75 CRI	575W	52,000	>120,000	>120,000	>120,000	8
TLC-LED-1500	LED 5700K - 75 CRI	1430W	160,000	>120,000	>120,000	>120,000	40

Light Level Summary

Calculation Grid Summary

Grid Name	Calculation Metric	Illumination					Circuits	Fixture Qty
		Ave	Min	Max	Max/Min	Ave/Min		
Football	Horizontal Illuminance	50.5	38	60	1.59	1.33	A,B	48
Press Box Candela	Horizontal	0.54	0.38	0.67	1.75	1.42	A	48
Press Box Candela	Max Candela (by Fixture)	7585	5207	9744	1.87	1.46	A	48
Property Line	Horizontal	0.32	0	2.67	0.00		A,B	48
Property Line	Max Candela (by Fixture)	21627	5.95	125604	21106.28	3634.87	A,B	48
Property Line	Max Vertical Illuminance Metric	0.71	0	5.94	0.00		A,B	48
Soccer Spill	Horizontal Illuminance	0.13	0.03	0.29	10.25	4.18	A	48
Soccer Spill	Max Candela Metric	17844	9042	32527	3.60	1.97	A	48
Soccer Spill	Max Vertical Illuminance Metric	0.40	0.17	0.84	5.00	2.36	A	48
Soccer	Horizontal Illuminance	51.1	38	60	1.59	1.34	A,B	48
Track	Horizontal Illuminance	15.9	3	30	11.10	5.30	A	48
Zero Grid	Horizontal Illuminance	6.12	0	59	7097.17		A,B	48

From Hometown to Professional



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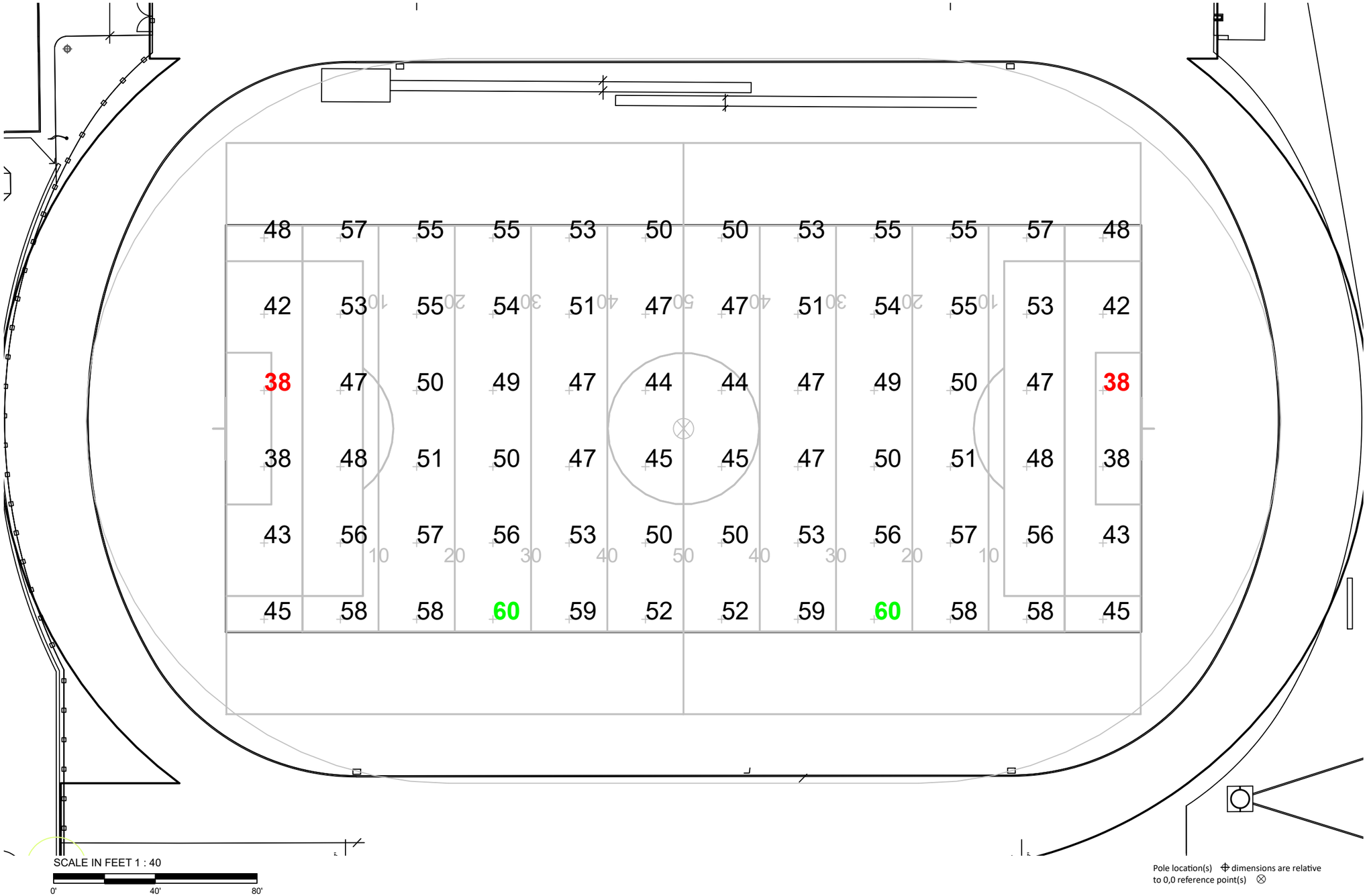
EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
2	F1-F2	80'	-	15.5'	TLC-BT-575	2	2	0
				80'	TLC-LED-1500	10	10	0
2	F3-F4	80'	-	25'	TLC-BT-575	2	2	0
				80'	TLC-LED-1500	10	10	0
4	TOTALS					48	48	0



Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

Martha's Vineyard McCarthy Field

Oak Bluffs, MA

GRID SUMMARY

Name:	**Football**
Size:	360' x 160'
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Guaranteed Average:	**50**
Scan Average:	50.50
Maximum:	60
Minimum:	38
Avg / Min:	1.35
Guaranteed Max / Min:	**2**
Max / Min:	1.59
UG (adjacent pts):	1.29
CU:	0.48
No. of Points:	72

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 160,000 lumens
No. of Luminaires:	**48**
Total Load:	61.8 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>120,000	>120,000	>120,000
TLC-LED-1500	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

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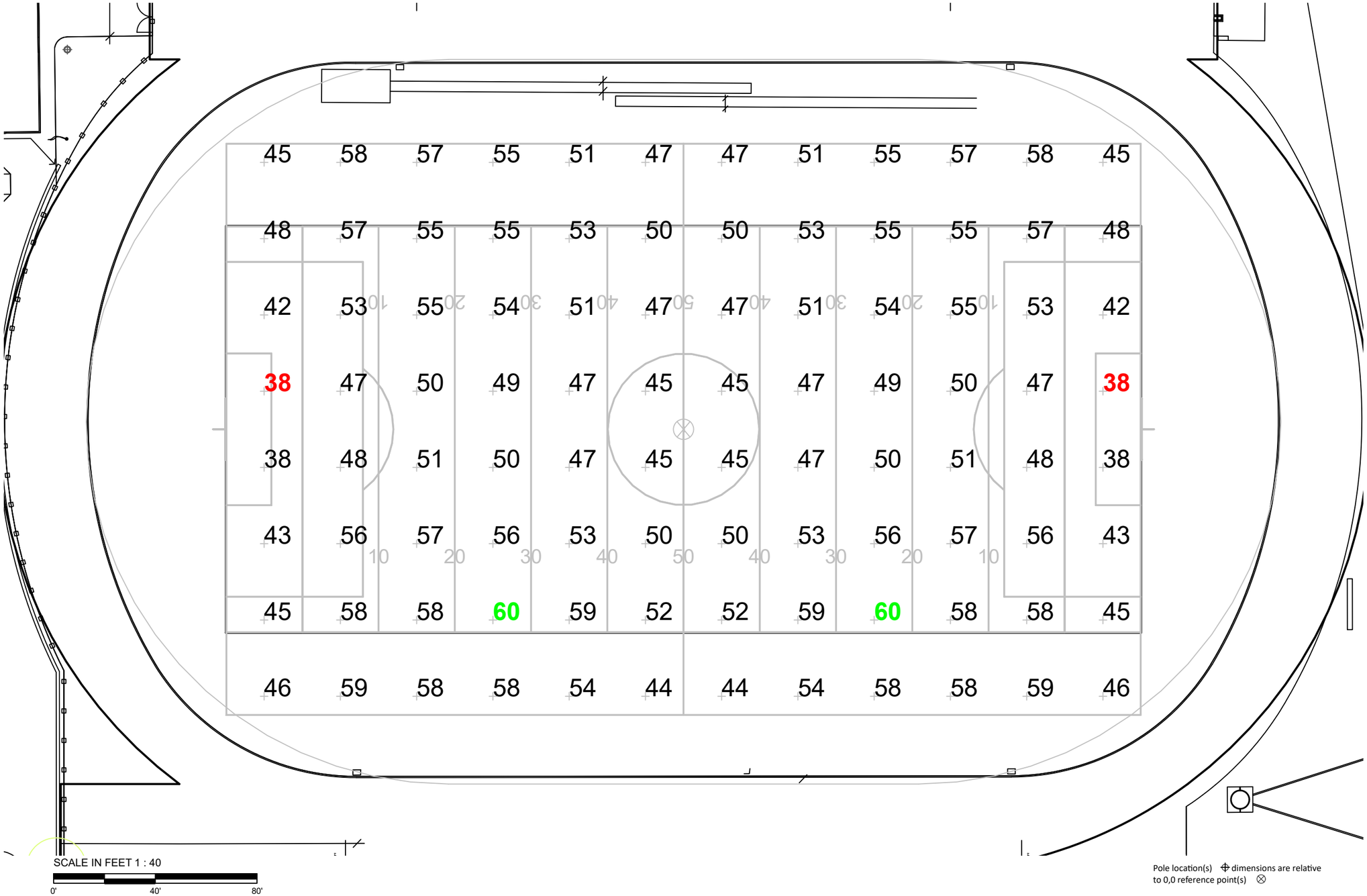
EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
2	F1-F2	80'	0'	15.52'	TLC-BT-575	2	2	0
				80'	TLC-LED-1500	10	10	0
2	F3-F4	80'	0'	25'	TLC-BT-575	2	2	0
				80'	TLC-LED-1500	10	10	0
4	TOTALS					48	48	0



Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

Martha's Vineyard McCarthy Field

Oak Bluffs, MA

GRID SUMMARY

Name:	**Soccer**
Size:	360' x 225'
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Guaranteed Average:	**50**
Scan Average:	51.05
Maximum:	60
Minimum:	38
Avg / Min:	1.36
Guaranteed Max / Min:	**2**
Max / Min:	1.59
UG (adjacent pts):	1.29
CU:	0.65
No. of Points:	96

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 160,000 lumens
No. of Luminaires:	**48**
Total Load:	61.8 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>120,000	>120,000	>120,000
TLC-LED-1500	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

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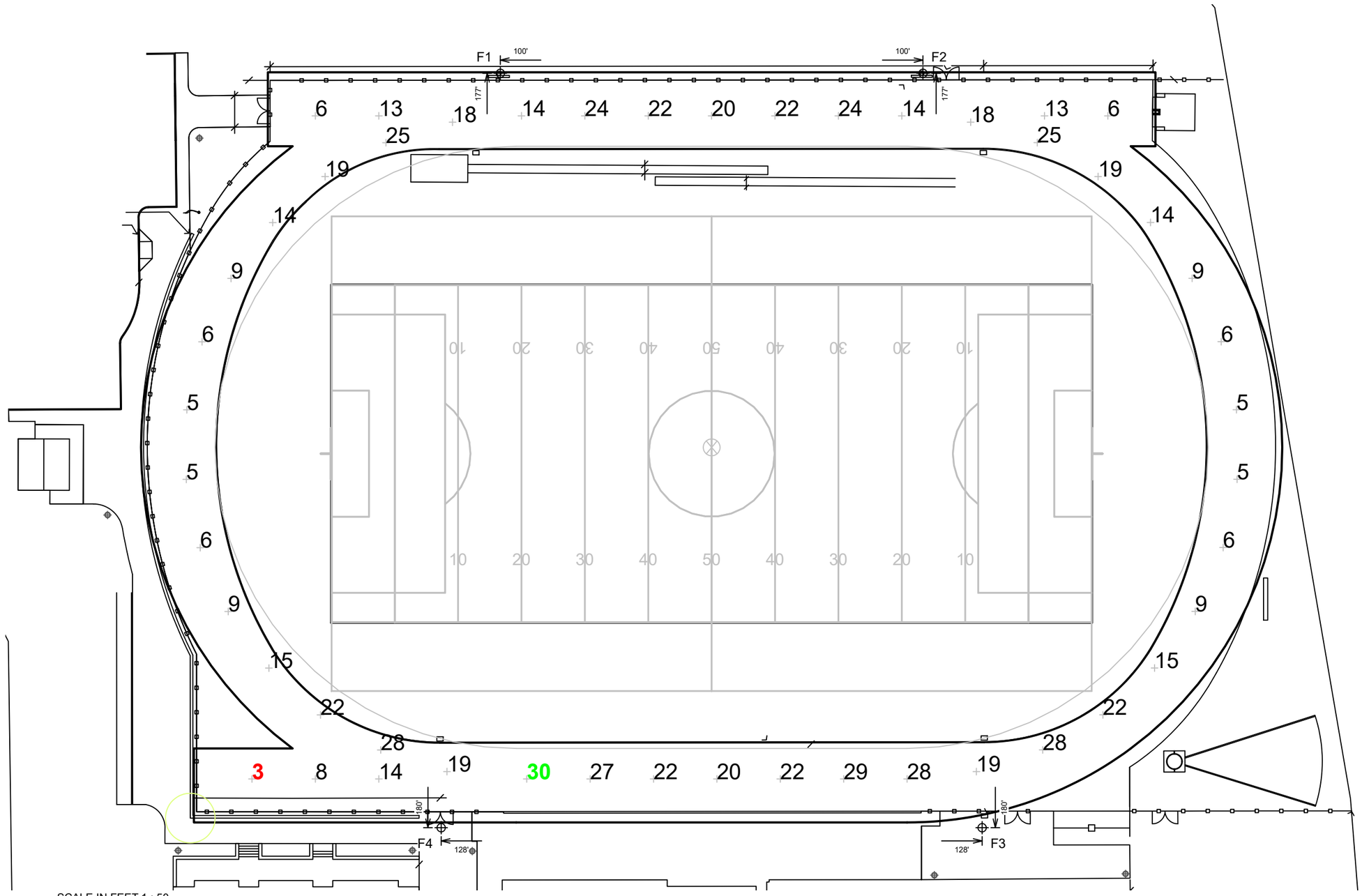
EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
2	F1-F2	80'	0'	15.54'	TLC-BT-575	2	2	0
				80'	TLC-LED-1500	10	10	0
2	F3-F4	80'	0'	25'	TLC-BT-575	2	2	0
				80'	TLC-LED-1500	10	10	0
4	TOTALS					48	48	0



Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

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Martha's Vineyard McCarthy Field

Oak Bluffs, MA

GRID SUMMARY

Name:	**Track**
Size:	Irregular
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**15.89**
Maximum:	30
Minimum:	3
Avg / Min:	5.95
Max / Min:	**11.10**
UG (adjacent pts):	0.00
CU:	0.10
No. of Points:	49

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 160,000 lumens
No. of Luminaires:	**48**
Total Load:	61.8 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>120,000	>120,000	>120,000
TLC-LED-1500	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

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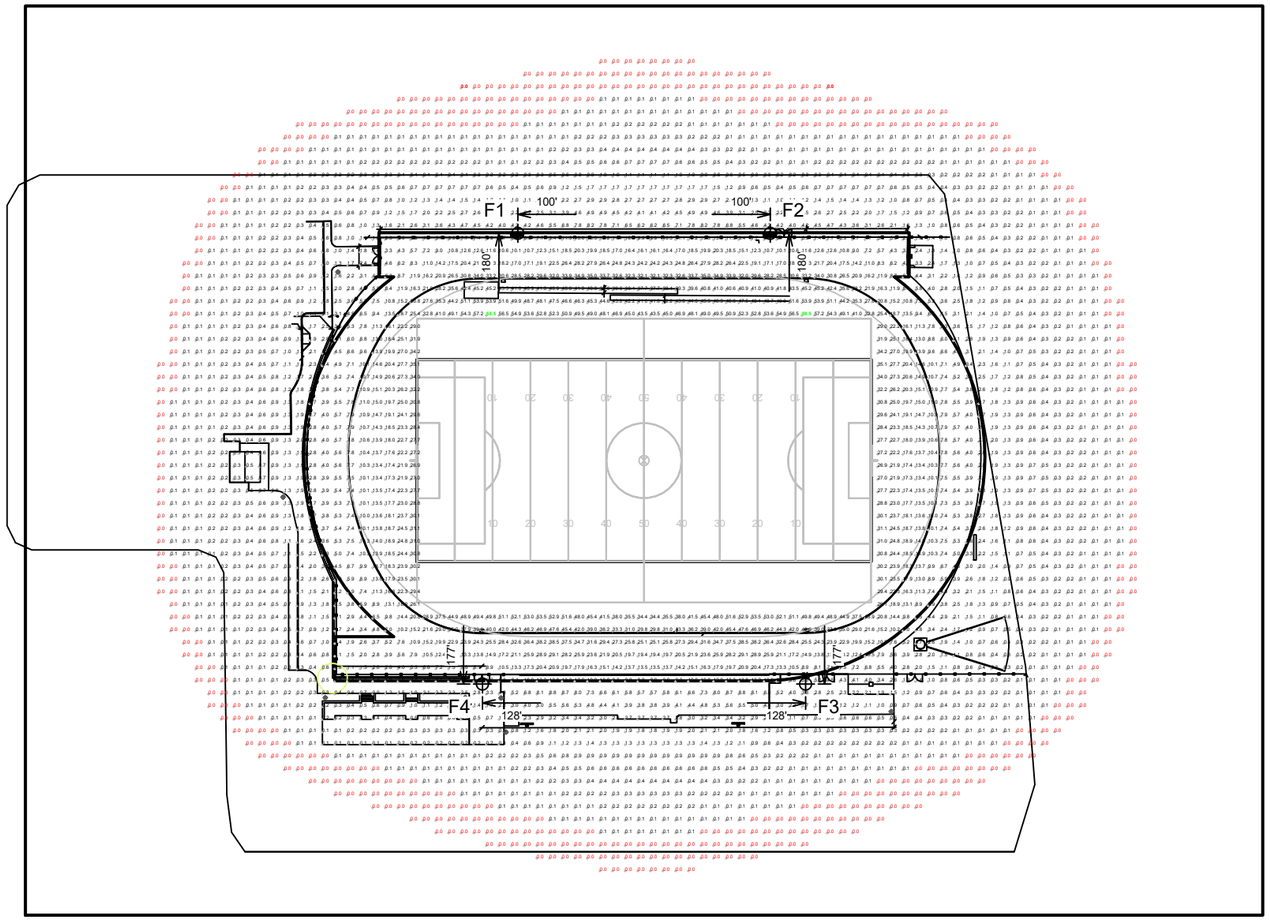
EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
2	F1-F2	80'	.06'	15.56'	TLC-BT-575	2	2	0
				80.06'	TLC-LED-1500	10	10	0
2	F3-F4	80'	.06'	25.06'	TLC-BT-575	2	2	0
				80.06'	TLC-LED-1500	10	10	0
4	TOTALS					48	48	0



SCALE IN FEET 1 : 120

0' 120' 240'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

Martha's Vineyard McCarthy Field

Oak Bluffs, MA

GRID SUMMARY

Name:	**Zero Grid**
Size:	980' x 720'
Spacing:	10.0' x 10.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**6.12**
Maximum:	59
Minimum:	0
Avg / Min:	741.65
Max / Min:	**7097.17**
UG (adjacent pts):	2.67
CU:	0.31
No. of Points:	3379

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 160,000 lumens
No. of Luminaires:	**48**
Total Load:	61.8 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>120,000	>120,000	>120,000
TLC-LED-1500	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

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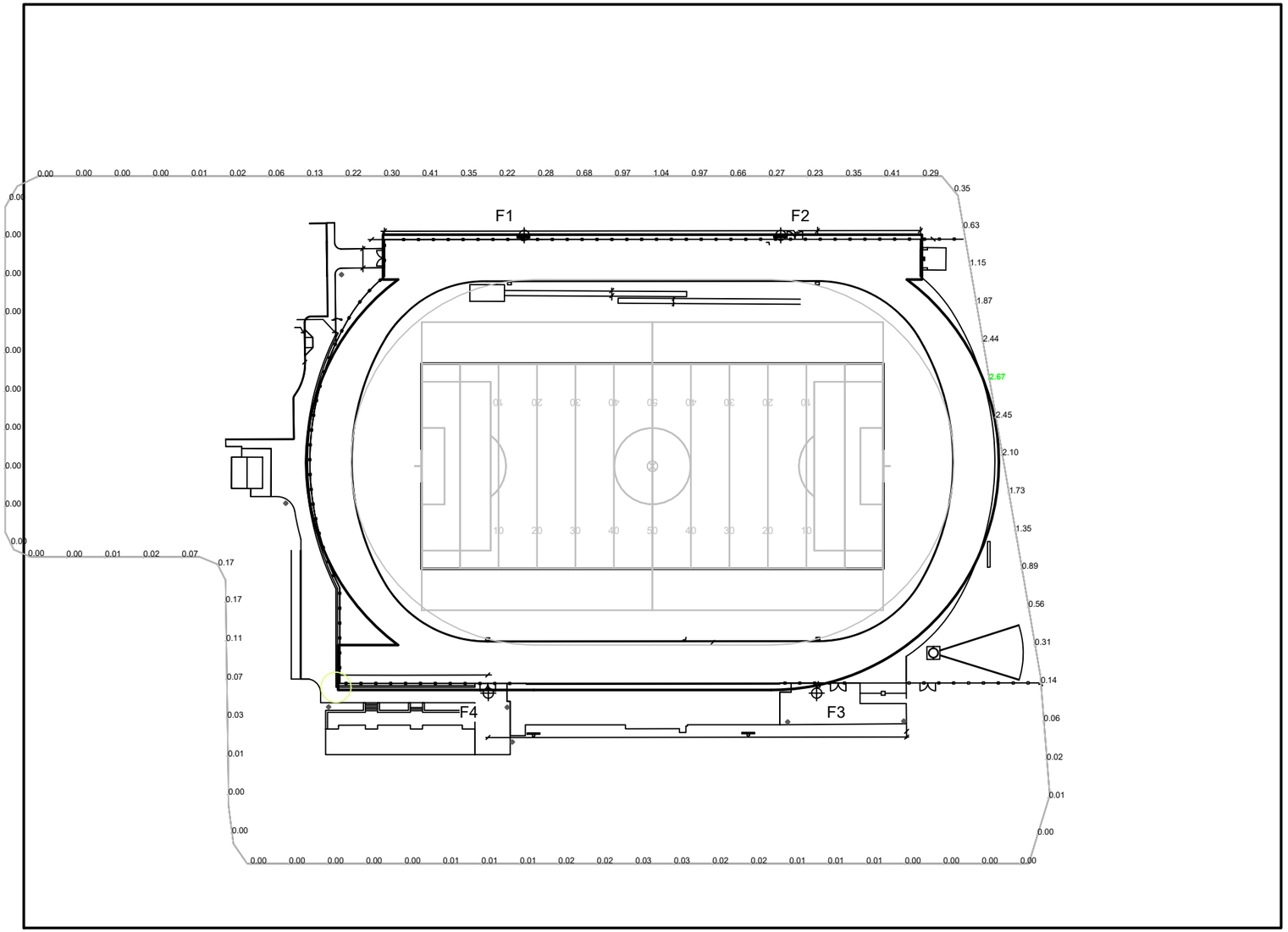
EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
2	F1-F2	80'	0'	15.52'	TLC-BT-575	2	2	0
				80'	TLC-LED-1500	10	10	0
2	F3-F4	80'	0'	25'	TLC-BT-575	2	2	0
				80'	TLC-LED-1500	10	10	0
4	TOTALS					48	48	0



SCALE IN FEET 1 : 100

0' 100' 200'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

Martha's Vineyard McCarthy Field

Oak Bluffs, MA

GRID SUMMARY

Name:	**Property Line**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**0.3198**
Maximum:	2.67
Minimum:	0.00
No. of Points:	86

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 160,000 lumens
No. of Luminaires:	**48**
Total Load:	61.8 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>120,000	>120,000	>120,000
TLC-LED-1500	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

ENGINEERED DESIGN By: Tanner Lanphier • File #179299D • 23-Jul-20

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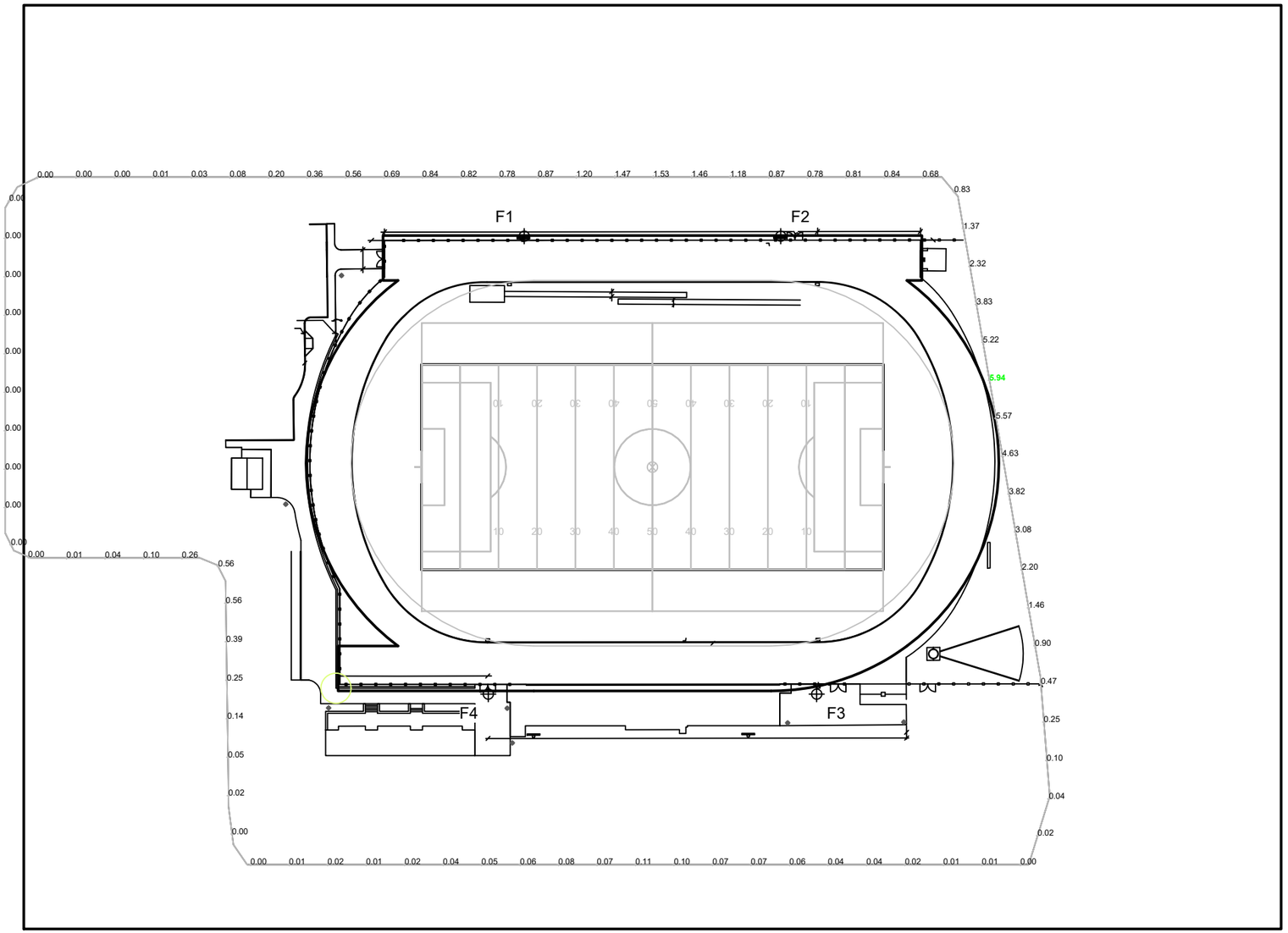
EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
2	F1-F2	80'	0'	15.52'	TLC-BT-575	2	2	0
				80'	TLC-LED-1500	10	10	0
2	F3-F4	80'	0'	25'	TLC-BT-575	2	2	0
				80'	TLC-LED-1500	10	10	0
4	TOTALS					48	48	0



SCALE IN FEET 1 : 100

0' 100' 200'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

Martha's Vineyard McCarthy Field

Oak Bluffs, MA

GRID SUMMARY

Name:	**Property Line**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAX VERTICAL FOOTCANDLES

	Entire Grid
Scan Average:	**0.7139**
Maximum:	5.94
Minimum:	0.00
No. of Points:	86

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 160,000 lumens
No. of Luminaires:	**48**
Total Load:	61.8 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>120,000	>120,000	>120,000
TLC-LED-1500	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

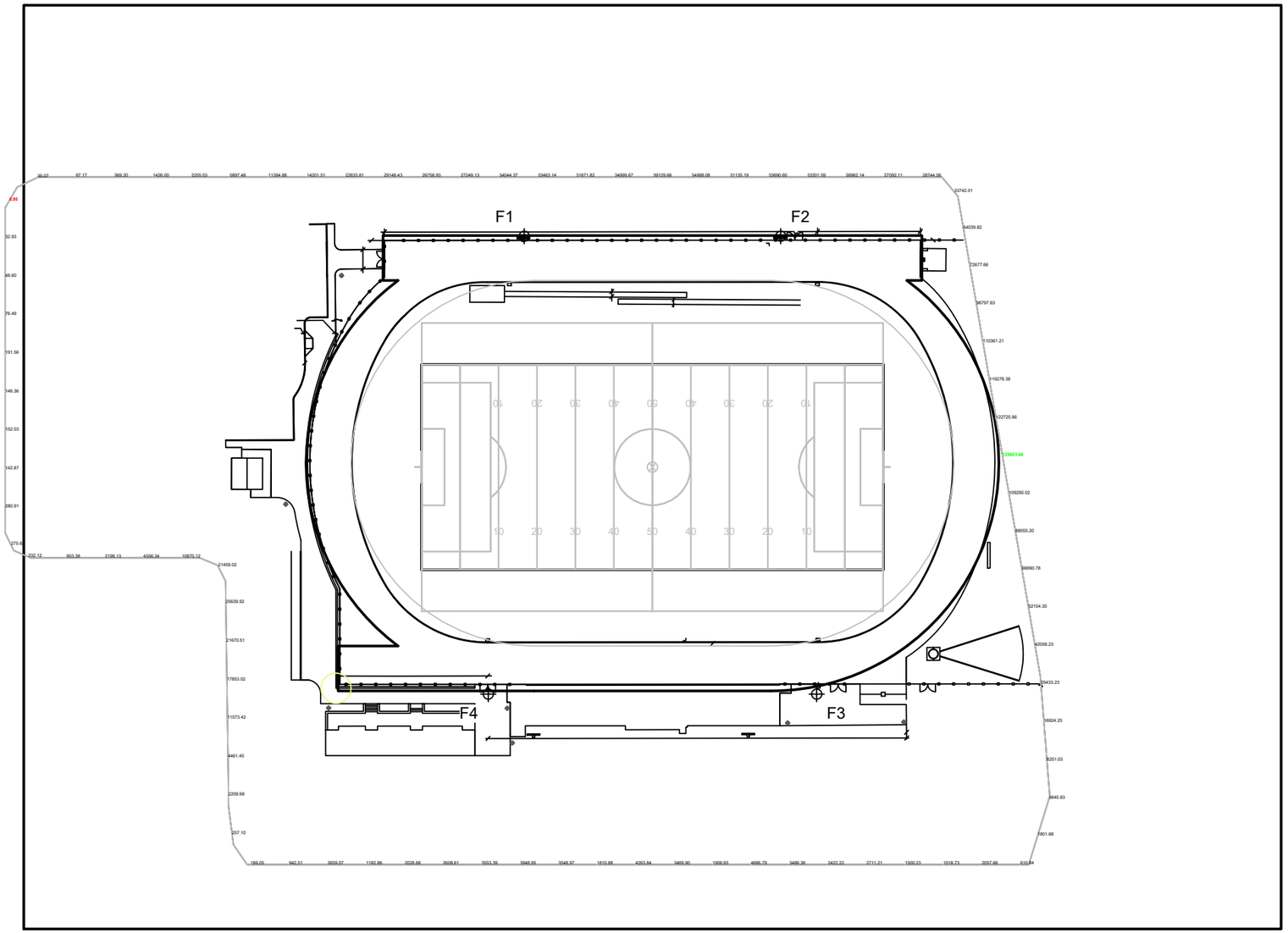
Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

ENGINEERED DESIGN By: Tanner Lanphier • File #179299D • 23-Jul-20

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
2	F1-F2	80'	0'	15.52'	TLC-BT-575	2	2	0
				80'	TLC-LED-1500	10	10	0
2	F3-F4	80'	0'	25'	TLC-BT-575	2	2	0
				80'	TLC-LED-1500	10	10	0
4	TOTALS					48	48	0



SCALE IN FEET 1 : 100

0' 100' 200'

Martha's Vineyard McCarthy Field

Oak Bluffs, MA

GRID SUMMARY

Name:	**Property Line**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

CANDELA (PER FIXTURE)

	Entire Grid
Scan Average:	**21627.4824**
Maximum:	125603.66
Minimum:	5.95
No. of Points:	86

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 160,000 lumens
No. of Luminaires:	**48**
Total Load:	61.8 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>120,000	>120,000	>120,000
TLC-LED-1500	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

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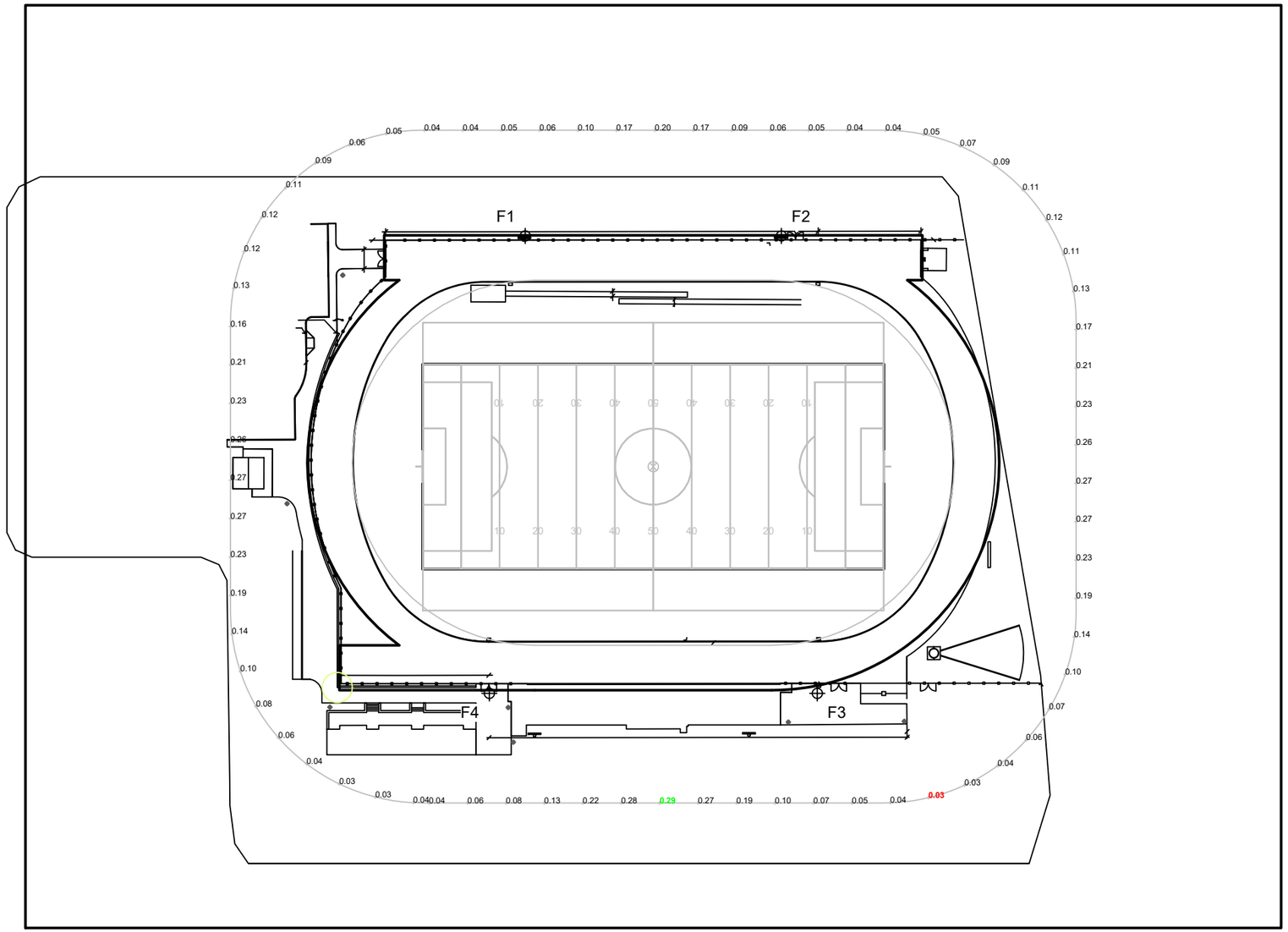
EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
2	F1-F2	80'	0'	15.52'	TLC-BT-575	2	2	0
				80'	TLC-LED-1500	10	10	0
2	F3-F4	80'	0'	25'	TLC-BT-575	2	2	0
				80'	TLC-LED-1500	10	10	0
4	TOTALS					48	48	0



SCALE IN FEET 1 : 100

0' 100' 200'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

Martha's Vineyard McCarthy Field

Oak Bluffs, MA

GRID SUMMARY

Name:	**Soccer Spill**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**0.1255**
Maximum:	0.29
Minimum:	0.03
No. of Points:	71

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 160,000 lumens
No. of Luminaires:	**48**
Total Load:	61.8 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>120,000	>120,000	>120,000
TLC-LED-1500	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

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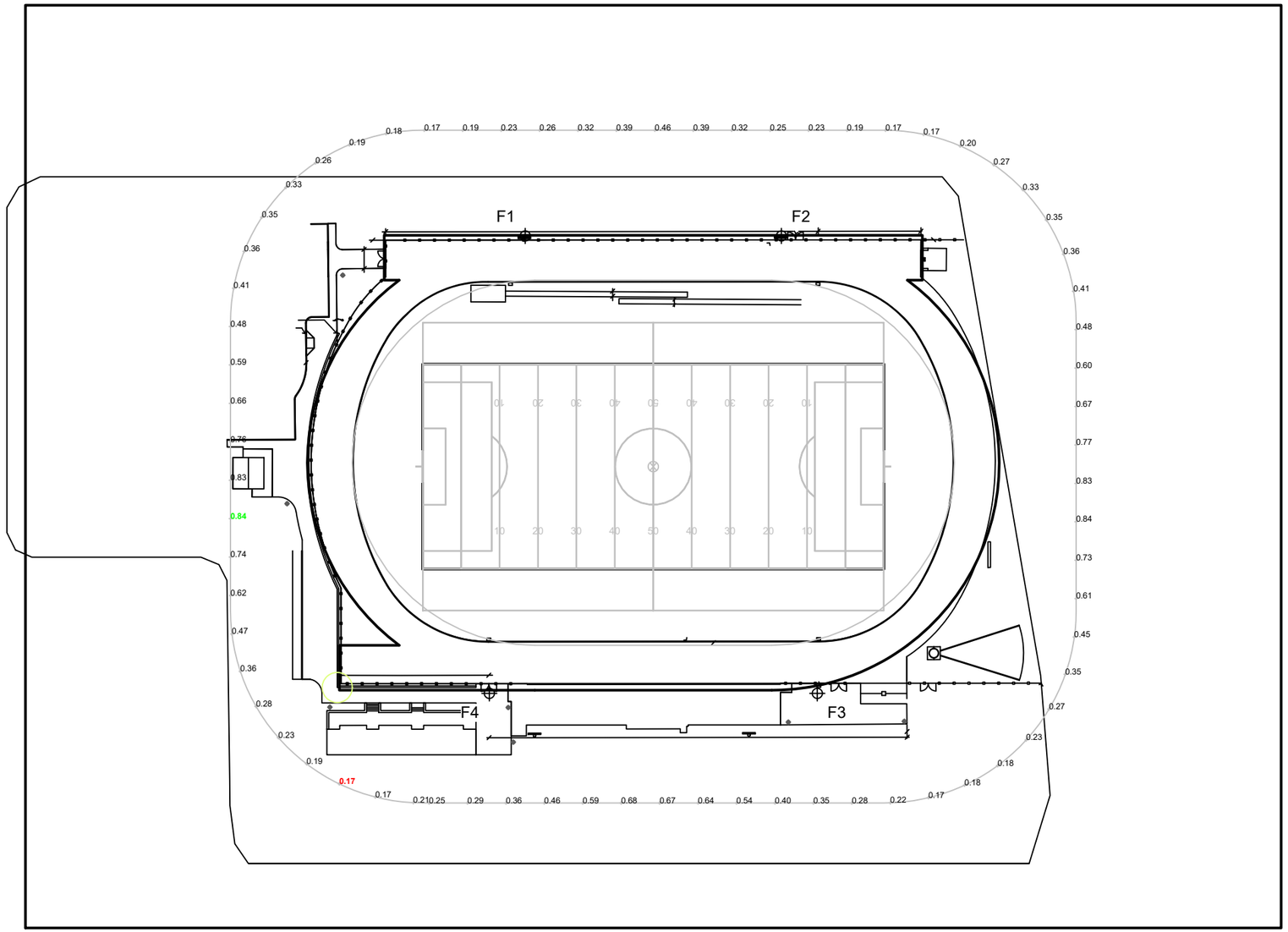
EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
2	F1-F2	80'	0'	15.52'	TLC-BT-575	2	2	0
				80'	TLC-LED-1500	10	10	0
2	F3-F4	80'	0'	25'	TLC-BT-575	2	2	0
				80'	TLC-LED-1500	10	10	0
4	TOTALS					48	48	0



SCALE IN FEET 1 : 100

0' 100' 200'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

Martha's Vineyard McCarthy Field

Oak Bluffs, MA

GRID SUMMARY

Name:	**Soccer Spill**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAX VERTICAL FOOTCANDLES

	Entire Grid
Scan Average:	**0.4006**
Maximum:	0.84
Minimum:	0.17
No. of Points:	71

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 160,000 lumens
No. of Luminaires:	**48**
Total Load:	61.8 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>120,000	>120,000	>120,000
TLC-LED-1500	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

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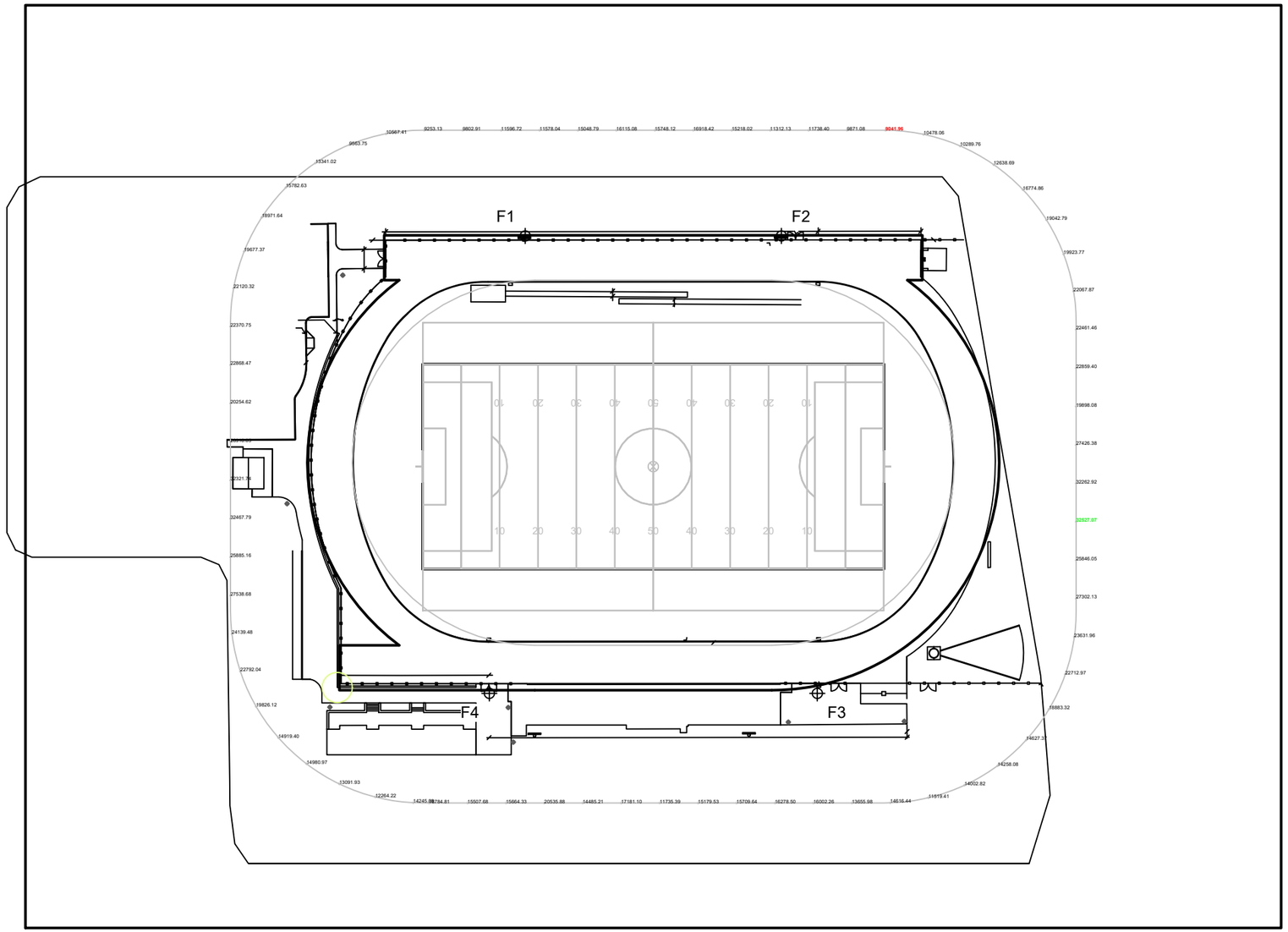
EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
2	F1-F2	80'	0'	15.52'	TLC-BT-575	2	2	0
				80'	TLC-LED-1500	10	10	0
2	F3-F4	80'	0'	25'	TLC-BT-575	2	2	0
				80'	TLC-LED-1500	10	10	0
4	TOTALS					48	48	0



SCALE IN FEET 1 : 100

0' 100' 200'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

Martha's Vineyard McCarthy Field

Oak Bluffs, MA

GRID SUMMARY

Name:	**Soccer Spill**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

CANDELA (PER FIXTURE)

	Entire Grid
Scan Average:	**17843.9902**
Maximum:	32527.07
Minimum:	9041.96
No. of Points:	71

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 160,000 lumens
No. of Luminaires:	**48**
Total Load:	61.8 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>120,000	>120,000	>120,000
TLC-LED-1500	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

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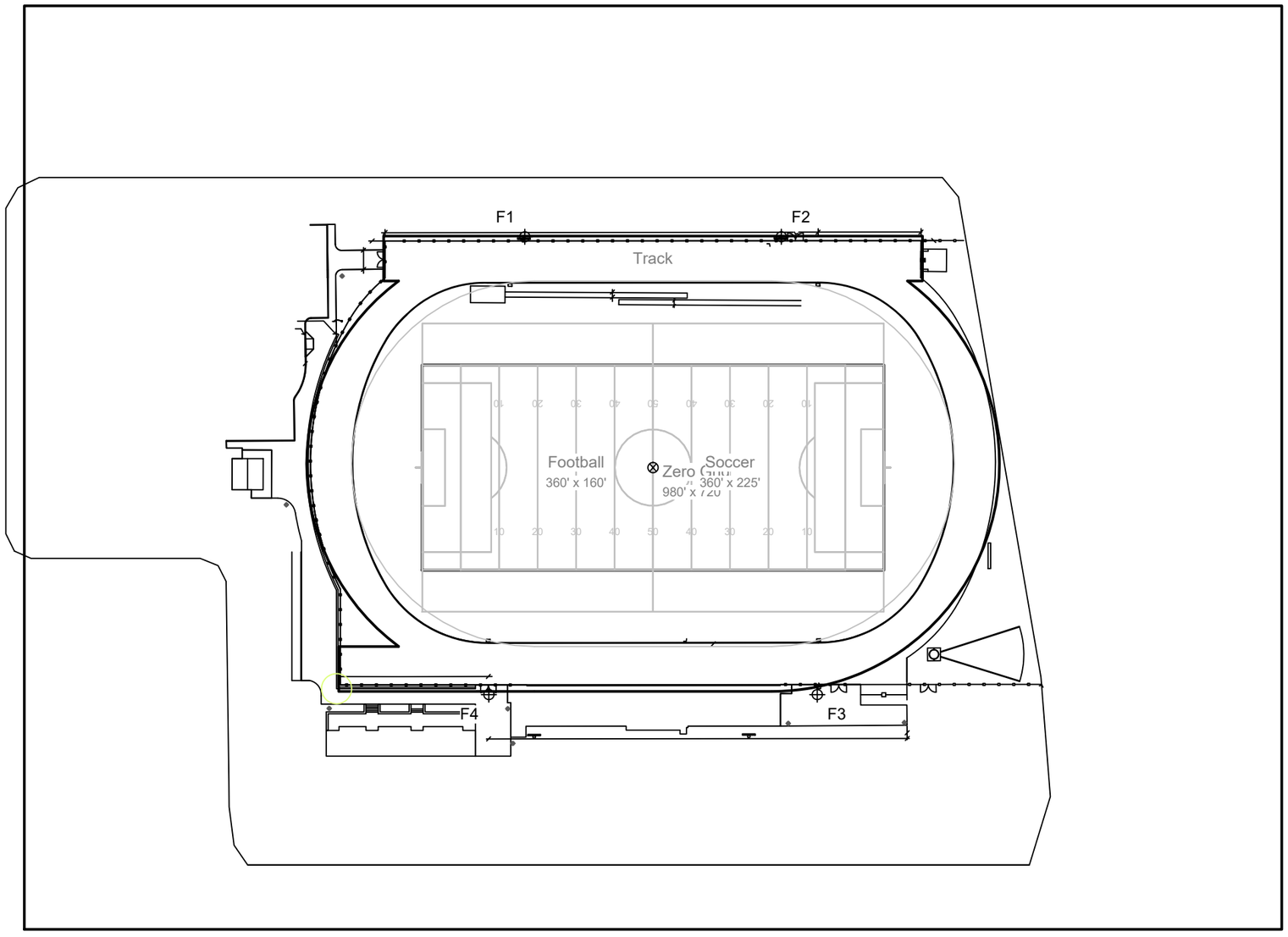
Martha's Vineyard McCarthy Field

Oak Bluffs, MA



EQUIPMENT LAYOUT

INCLUDES:
- Football
- Soccer
- Track
- Zero Grid

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires		
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE
2	F1-F2	80'	-	15.5' 80'	TLC-BT-575 TLC-LED-1500	2 10
2	F3-F4	80'	-	25' 80'	TLC-BT-575 TLC-LED-1500	2 10
4	TOTALS					48

SINGLE LUMINAIRE AMPERAGE DRAW CHART

Ballast Specifications (.90 min power factor)	Line Amperage Per Luminaire (max draw)						
Single Phase Voltage	208 (60)	220 (60)	240 (60)	277 (60)	347 (60)	380 (60)	480 (60)
TLC-BT-575	3.4	3.2	2.9	2.5	2.0	1.8	1.5
TLC-LED-1500	8.5	8.1	7.4	6.4	5.1	4.7	3.7

SCALE IN FEET 1 : 100

0' 100' 200'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

ENGINEERED DESIGN By: Tanner Lanphier • File #179299D • 23-Jul-20

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IDA-Criteria for Community-Friendly Outdoor Sports Lighting v1.0

1. Compliance with all applicable Codes and Standards (e.g. Underwriter Laboratories, CEC, National Building Codes with Local Amendments)

2. **Target Illumination** – Measured on-field illuminance values appropriate for the application per IESNA RP-6-15 Sports and Recreational Area Lighting criteria (or equivalent CIE guidance) together with modeled initial illuminance targets. Only IES Class III & IV level and State High School Lighting Recommendation illumination levels are eligible for the Award of Excellence. To limit over-lighting, the design may vary by no more than 10% above the average target illuminance levels for each Class.

3. As the IES TM-15-11 Luminaire Classification System for Outdoor Lighting is not appropriate for sports lighting, a modified approach to controlling backlight, uplight, and glare is applied with the following metrics:

   A. **Backlight** – Directionality and application efficiency will be addressed indirectly through two methods that quantify off-site performance, one using the design luminance and another using measured illuminance. Backlight criteria will be difficult to meet without sufficient and appropriate setback of sports fields from the properly line.

      a. Total designed lumens not contained within the area encompassing the field perimeter and an area immediately adjacent to that area that has a 33 foot (10 meter) offset. As modeled, no more than 15% of the total lumens may be outside of this region.

      b. Measured spill illuminance values, as measured with the light meter aimed in the direction of the brightest reading, shall not exceed criteria for the respective Environmental Zone (Table 1 below) nor shall it exceed the maximum initial spill illuminance values as modeled and specified in the design process. These measurements shall be taken a distance equal to 150’ beyond the edge of the field. Measurements should be conducted with and without the facility lighting operating so that the sports facility lighting can be isolated from other natural and artificial light sources.

         Table 1 – Allowable spill illuminance to control backlight

Lighting Zone		Spill Illuminance at Setback
Environmental Zone (IESNA RP-33-99)	MLO Lighting Zone (IDA Model Lighting Ordinance)	
E2 – E4	LZ1 – LZ4	≤0.20 ft-c / ≤2.0 lux

B. **Uplight** – All luminaires must be designed such as to not to emit direct light above the horizon, unless required for the activity (i.e. aerial sports) being played. In those cases, only 8% of the total (directly) applied lumens as modeled may be in this zone. For modeling purposes, a horizontal ceiling grid shall be placed 5 feet (1.5 meters) above the top of the tallest pole, extending out to 150 feet (45 meters) beyond the edge of the field to determine compliance. Installation shall not deviate from the design.

C. **Glare** – Modeled luminous intensity from any luminaire for any viewing angle at 5' above grade level, at a distance equal to 150' beyond the edge of the field shall not exceed 1000 candela (absolute). Luminaires shall not emit more than 250 lumens in the "Very High" glare zone, ranging from 80° to 90° above nadir. This shall be verified through a luminaire photometric report and aiming summary report and visual inspection, or through an equivalent software application and visual inspection.[1]

4. **Lighting Zoning** – Community-Friendly Outdoor Sports Lighting will only be certified if located in environmental zones E2 through E4, or MLO lighting zone LZ1 through LZ4. Areas especially sensitive to lighting such as E1 or LZ0 are not appropriate for this award program.

5. **Application Efficiency** – The lighting system shall achieve a minimum Application Efficiency of 70 lumens per watt, calculated per the following formula (or the metric equivalent):

$$\frac{\text{Target area square footage} \times \text{Avg. Maintained Design ft-c}}{\text{Total System Watts}} = \text{Applied Lumens/watt}$$

''Target Area' is defined as the total grid area for the sports field and/or sports court as defined by the IES LM-5-04 IESNA Guide for Photometric Measurements of Area and Sports Lighting Installments (or CIE equivalent guidance).

[1] When commercial meters are widely available to measure luminous intensity in the field, these criteria will be amended to also require a measurement component for glare.

6. **Controls** – Provide advanced controls and documentation for the following:

    a. Automatic and/or remote control system via smartphone apps, or direct remote communication to the company facility responsible for handling the lighting controls, to enforce shut-off at locally established curfew time, not to be later than 11:00 PM (2300 hrs).

    b. On-site manual and/or remote control system shall also be provided to allow for the lights to be turned on or off at will (before curfew) to assure that only active sports fields are lighted.

    c. Provide readily accessible controls to implement uniform and variable adaptive illumination levels for different task lighting needs on field, e.g. IES class of play, competition athletics, band practice, striping, mowing, sports practice, etc. Adaptive dimming shall be possible across the range of 25% to 100% of full illumination.[2]

    d. A formal policy defining the appropriate level of illumination necessary for the specific activities and curfew times must be established and enforced. A copy of the policy will be included in the application for the Award of Excellence.

7. **Color** – Luminaire Correlated Color Temperature (CCT) may not exceed 5700°K, as defined by ANSI C78.377. Luminaire CCT must be determined through empirical measurements as defined by IESNA LM-79 (or CIE equivalent) and performed by a laboratory appropriately accredited by NVLAP. Installation shall be verified by measurement across the target area.[3]

8. **Other Lighting** – The installed field lighting is not to be used for illuminating other area tasks. For example, if parking and concession areas lighting is desired, those areas shall be illuminated by separate luminaires and systems not associated with sports field illuminance needs. Other outdoor lighting at the site must, at a minimum, meet the lighting standards and lighting codes established by the community, and must meet the standards set forth in the IDA Model Lighting Ordinance for the relevant lighting zones and tasks.

[2] IDA is developing guidance for the appropriate illumination levels for non-sports activities and tasks that often occur on playing fields.

[3] Some variance in the measured CCT values are permitted, following the ANSI guidance.

Frequently Asked Questions

IDA-Criteria for Community-Friendly Outdoor Sports Lighting

1. **Why is IDA creating criteria for IDA Community-Friendly Outdoor Sports Lighting? Aren't you simply "certifying" more light pollution?**

   Since 2007, IDA's Fixture Seal of Approval (FSA) Program has successfully evaluated roadway, wall pack and walkway luminaires that have been utilized in communities to promote the protection of the nighttime environment. Although successful, the FSA was neither developed nor intended to apply to athletic field lighting, due to the need that the facilities' luminaries had to be positioned above full cutoff orientations. This resulted in a number of issues and concerns in communities where general lighting practices were promoting dark skies, yet local sporting facilities – which were being lit with non-shielded luminaires – were exacerbating sky glow and light pollution.

   To encourage the use of the best available technology for dark sky preservation, IDA has established Criteria for Community-Friendly Outdoor Sports Lighting that upholds the values that many communities seek in their public illuminated spaces. These criteria ensure that outdoor sports lighting design minimizes obtrusive light spill and glare into surrounding neighborhoods and natural areas, meets sustainability and climate-friendly goals, and reduces sky glow to the greatest extent practicable. By utilizing IDA's criteria, communities demonstrate and promote the vision for outdoor sports lighting that simultaneously meets the demanding task of illuminating night-time sports events while preserving night skies.

2. **How will the IDA-Criteria for Community-Friendly Outdoor Sports Lighting protect my neighborhood from light pollution?**

   By adopting the IDA-Criteria for Community-Friendly Outdoor Sports Lighting, communities will:

   - Minimize neighborhood lighting nuisance by greatly reducing spill and glare disruption.
   - Manage high angle glare, thus dramatically decreasing off-site light trespass and sky glow.

- Mitigate neighborhood nuisance factors and sky glow which, in turn, provide benefits to the environment, the astronomy community, and others.
- Minimize lumen densities, which reduce energy consumption.

3. **For what types of play field is the IDA-Criteria for Community-Friendly Outdoor Sports Lighting appropriate?**

   The criteria specify that only facilities used for soccer, baseball, tennis and other recreational activities typically associated with schools and community parks qualify for consideration.

4. **Who should know about the IDA-Criteria for Community-Friendly Outdoor Sports Lighting?**

   To promote lighting that helps protect the nighttime environment, we recommend contacting city council members, community representatives, home owner associations, and parks and recreation authorities to encourage their use of the IDA-Criteria for Community-Friendly Outdoor Sports Lighting when designing or retrofitting playfields.

5. **Why do the criteria utilize a maximum allowable correlated color temperature of 5700 kelvin (k) when IDA recommends 3000k for roadway and general area lighting?**

   IDA's recommendation for correlated color temperature values of outdoor lighting applications have been, and remain, 3000k maximum. Street and area lighting illuminances are established at levels to facilitate safe way-finding and hazard identification, while minimizing light trespass and the disruption of nocturnal habitats. By contrast, sports fields have high levels of human activity and ball speeds where visibility is essential, requiring the allowance for design professional and end user preferences of light sources of up to 5700k. Nonetheless, the use of advanced technologies combined with rigorous design standards, curfews, and variable output controls tailored to the need of the activity, sports lighting facilities **can** be constructed or retrofit to essentially eliminate light trespass and curtail sky glow, protect nocturnal habitat, moderate neighborhood nuisance glare, and support dark skies.

6. **Can the IDA-Criteria for Community-Friendly Outdoor Sports Lighting be achieved with existing installations?**

   Light trespass limitations of the IDA-Criteria for Community-Friendly Outdoor Sports Lighting are stringent, and likely will not be met if older technologies and design

parameters are used, but holistic lighting moderniazations of legacy applications are possible under this guidelines.

7. **Does IDA intend to formally certify and recognize facilities that fully comply with the standards established in the criteria?**

   It is anticipated that in, the next several months, IDA will establish a program that certifies outdoor facilities that fully comply with IDA-Criteria for Community-Friendly Outdoor Sports Lighting. We are currently developing software that will provide preliminary evaluations of facilities and that can be used to guide their design, or retrofit, so that they meet the program's strict standards. Once a field has been constructed, or retrofit, to these standards, IDA will conduct an on-site verification test to ensure that the facility still complies with the criteria and, if so, will be certified and recognized by IDA as compliant with IDA-Criteria for Community-Friendly Outdoor Sports Lighting.